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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JEAN LOUIS CALVIGNAC and FABRICE JEAN VERPLANKEN

Appeal 2009-000031
Application 10/015,165[1]
Technology Center 2100

Before HOWARD B. BLANKENSHIP, JEAN R. HOMERE, and JAMES R. HUGHES, *Administrative Patent Judges*.

HOMERE, *Administrative Patent Judge*.

DECISION ON APPEAL[2]

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[1] Filed on December 11, 2001. The real party in interest is International Business Machines Corp. (Br. 2.)

[2] The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, or for filing a request for rehearing, as recited in 37 C.F.R. § 41.52, begins to run from the "MAIL DATE" (paper delivery mode) or the "NOTIFICATION DATE" (electronic delivery mode) shown on the PTOL-90A cover letter attached to this decision.

I. STATEMENT OF THE CASE

Appellants appeal under 35 U.S.C. § 134(a) (2002) from the Examiner's final rejection of 1 through 4, 6 through 23, and 26 through 34. (Br. 2.)[3] Claims 5, 24, and 25 have been cancelled. (*Id.*) We have jurisdiction under 35 U.S.C. § 6(b) (2008).

We affirm-in-part.

Appellants' Invention

Appellants invented a method and apparatus for searching database structures, such as Contents Address Memory ("CAM"), utilizing a network processor. (Spec. 1, ll. 14-15; spec. 2, ll. 16-17.) According to Appellants, the claimed invention reduces the latency resulting from correlating a packet with a database in the network processor. (*Id.* at 2, ll. 17-19.)

Illustrative Claim

Independent claims 1 and 12 further illustrate the invention as follows:

1. A search method comprising the acts of:
   (a) using N bits, N being an integer, from a packet as an index into a data structure including a Direct Table with at least one entry and a tree structure operatively coupled to said one entry;
   (b) setting a threshold based upon a fixed number of nodes to be traversed in the tree structure;
   (c) using select bits from the packet to traverse said tree structure until the threshold is met;
   (d) storing in a Contents Address Memory (CAM) at least one entry based upon a predetermined characteristic of the packet and a second predetermined characteristic of said tree structure;
   (e) reading the CAM; and

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[3] All references to the Appeal Brief are to the Appeal Brief filed on February 12, 2007, which replaced the prior Appeal Briefs filed on February 13, 2006, May 17, 2006, August 18, 2006, September 7, 2006, and October 17, 2006.

(e1) using information at the at least one entry to access a memory location whereat action to be taken relative to the packet is stored.

12. An apparatus comprising:

an embedded processor complex including a plurality of protocol processors;

a control point processor operatively coupled to the processor complex;

a plurality of hardware accelerator co-processors accessible to each protocol processor and providing high speed pattern searching, data manipulation and frame parsing;

at least one memory device, operatively coupled to the processor complex, that stores data structures including a Direct Table, nodes and leaves operatively chained together; and

a Memory location operatively coupled to the processor complex and storing a value representative of the maximum number of nodes to be accessed during a tree search routine.

Prior Art Relied Upon

The Examiner relies on the following prior art as evidence of unpatentability:

Spinney	5,414,704[4]	May 9, 1995
Weaver	6,173,384 B1	Jan. 9, 2001
Gupta	6,691,124 B2	Feb. 10, 2004 (filed Apr. 4, 2001)

Rejections on Appeal

The Examiner rejects the claims on appeal as follows:

Claims 32 and 34 stand rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement.

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[4] Both the Examiner and Appellants reference Spinney as U.S. Patent No. 5,417,704. (Br. 6; Ans. 4.) It is apparent that the U.S. Patent No. 5,417,704 was a typographical error and we therefore presume that both the Examiner and Appellants intended to reference U.S. Patent No. 5,414,704.

Claims 1, 8 through 15, 17 through 23, 26 through 31, and 33 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Gupta and Spinney.

Claims 2 through 4, 6, 7, and 16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Gupta, Spinney, and Weaver.

Appellants' Contentions

1. Appellants contend that the Examiner erred in finding that the original Specification does not support that "the tree walk and CAM search are being executed sequentially," and the "traverse of the tree structure and CAM read are performed sequentially," as recited in dependent claims 32 and 34, respectively. (Br. 6-7.) In particular, Appellants argue that the original Specification provides support for such recited limitations since the disclosed process of traversing the nodes is followed by accessing the CAM in a sequential manner. (*Id.* at 7.) Additionally, Appellants allege that "thereafter" means from then on. Similarly, Appellants allege that the disclosure of tree walking or traversing a set number of nodes followed by accessing the CAM provides support for the claimed sequence. (*Id.*) Thus, Appellants contend that dependent claims 32 and 34 comply with the written description requirement. (*Id.* at 7-8.)

2. Appellants contend that Gupta does not teach "setting a threshold based upon a fixed number of nodes to be traversed in the tree structure," and "using select bits from the packet to traverse said tree structure until the threshold is met," as recited in independent claim 1. (Br. at 8.) In particular, Appellants argue that Gupta's disclosure of searching a branch until all nodes are traversed implies that there is no need to set a

threshold based upon a fixed number of nodes to traverse, as claimed. (*Id.* at 8-9.) Appellants also allege that Gupta's disclosure of comparing a count with a threshold does not teach how the threshold was obtained and, therefore, can be differentiated from "setting a threshold based upon a fixed number of nodes to be traversed in the tree structure," as claimed. (*Id.* at 10.) Further, Appellants contend that Spinney does not teach "storing in a Contents Address Memory (CAM) at least one entry based upon a predetermined characteristic of the packet and a second predetermined characteristic of said tree structure," as recited in independent claim 1. (*Id.* at 9.) In particular, Appellants argue that Spinney discloses storing only frame or packet characteristics, whereas the claimed invention also calls for storing characteristics of a tree structure. (*Id.*)

Additionally, Appellants allege that modifying Gupta to teach setting a threshold based on a fixed number of nodes and traversing the tree until the threshold is met would effectively change Gupta's principle of operation. (*Id.* at 9.) Appellants also contend that Gupta's disclosure of traversing all nodes in a branch teaches away from the traversing a fixed number of nodes, as claimed. (*Id.* at 10.)

3. Appellants contend that Spinney's disclosure of a controller that contains a processor or a state machine does not teach "an embedded processor complex including a plurality of protocol processors," as recited in independent claim 12. (*Id.* at 14.) Further, Appellants argue that Gupta's disclosure of a hybrid trie structure with nodes and leaves does not teach "a Direct table," as recited in independent claim 12. (*Id.* at 14-15.)

Examiner's Findings and Conclusions

1. The Examiner finds that sequential is defined as "characterized by regular sequence of parts," whereas "once" is defined as "if or when at anytime; if ever or whenever, as soon as." (Ans.[5] 18-19.) In particular, the Examiner finds that Appellants' disclosure of "once" does not have the same meaning as "sequentially" and, therefore, Appellants' Specification does not provide support for executing the tree walk and the search/read sequentially. (*Id.* at 19.) Additionally, the Examiner finds that Appellants' reliance on "simultaneously" is unfounded because "simultaneously" is defined as occurring at the same time, whereas the disputed claims require the tree walk and the search/read to occur in sequence. (*Id.*) Thus, the Examiner finds that the claim limitations do not comply with the written description requirement. *(Id.)*

2. The Examiner finds that Gupta's disclosure of comparing the count of data elements with a threshold, whereby the threshold is set based on the number of nodes within a tree, teaches setting a threshold, as claimed. (*Id.* at 19, 21.) The Examiner also finds that independent claim 1 does not preclude a "fixed number of nodes" to include all nodes from a tree structure. (*Id.* at 19.) Further, the Examiner finds that Spinney's disclosure of storing addresses in both a CAM and a binary search tree structure teaches "storing in a Contents Address Memory (CAM) at least one entry based upon a predetermined characteristic of the packet and a second predetermined characteristic of said tree structure," as claimed. (*Id.* at 19-20.) Additionally, the Examiner does not find Appellants' arguments

[5] All references to the Examiner's Answer are to the Answer filed on November 27, 2007, which replaced the prior Answer filed on June 28, 2007.

pertaining to changing Gupta's principle of operation, and Gupta teaching away from the claimed invention, persuasive. (*Id.* at 21.) In particular, the Examiner reiterates that Gupta teaches setting a threshold and, further, independent claim 1 does not preclude a "fixed number of nodes" to include all nodes from a tree structure. (*Id.*)

3. The Examiner finds that Spinney's disclosure of a controller that includes a processor which executes various processes and accesses packet memory teaches "an embedded processor complex including a plurality of protocol processors," as claimed. (*Id.* at 22-23.)

II. ISSUES

1. Have Appellants shown that the Examiner erred in finding that the claimed invention fails to comply with the written description requirement? In particular, the issue turns on whether Appellants' original disclosure supports "the tree walk and CAM search are being executed sequentially," and "traverse of the tree structure and CAM read are performed sequentially," as recited in dependent claims 32 and 34, respectively.

2. Have Appellants shown that the Examiner erred in concluding that the combination of Gupta and Spinney renders independent claim 1 unpatentable? In particular, the issue turns on:

(a) the proffered combination teaches "setting a threshold based upon a fixed number of nodes to be traversed in the tree structure," as recited in independent claim 1;

(b) the proffered combination teaches "using select bits from the packet to traverse said tree structure until the threshold is met," as recited in independent claim 1; and

(c) the proffered combination teaches "storing in a Contents Address Memory (CAM) at least one entry based upon a predetermined characteristic of the packet and a second predetermined characteristic of said tree structure," as recited in independent claim 1;

(d) modifying Gupta would effectively change Gupta's principle of operation; and

(e) Gupta's disclosure of traversing all nodes in a branch teaches away from the claimed invention.

3. Have Appellants shown that the Examiner erred in concluding that the combination of Gupta and Spinney renders independent claim 12 unpatentable? In particular, the issue turns on whether the proffered combination teaches "an embedded processor complex including a plurality of protocol processors," as recited in independent claim 12.

III. FINDINGS OF FACT

The following Findings of Fact ("FF") are shown by a preponderance of the evidence.

Appellants' Specification

1. Appellants' Specification states that "[t]he two operations started simultaneously [but] can finish in any sequence, Tree-Walk Logic first or CAM first." (Spec. 16, ll. 20-21.)

Gupta

2. Gupta generally relates to searching data in a relative large database with compact data structures, while still providing relatively fast retrieval and updating of the respective data. (Abst.; col. 1, ll. 8-9.) Gupta discloses that a large, compact database includes a hybrid tree or trie. (Abst.)

3. Gupta's figure 1 depicts a hybrid trie data structure that includes search nodes. (Col. 3, ll. 53-54.) Gupta discloses that the hybrid trie (100) includes a set of branch nodes (110), a set of leaf-search nodes (120), and a set of branch-search nodes (130). (Col. 3, ll. 55-57.) Gupta discloses that a branch-search node (130) can be used for traversing the hybrid trie (100) and to match a lookup search key against one of a set of prefix values. (Col. 4, ll. 47-50.)

4. Gupta's figure 3 depicts a process flow diagram of a data lookup method (300). (Col. 5, ll. 42-45.) Gupta discloses that the data lookup method (300) proceeds until the lookup search key is exhausted and there are not further nodes below the node being looked at for the lookup operation to review. (Col. 6, ll. 16-21.)

5. Gupta's figure 4 depicts a process of updating data. (Col. 6, ll. 48-49.) At step 411, Gupta discloses that the method (400) selects a node for the update operation. (*Id.* at ll. 59-60.) At step 412, Gupta discloses that the method (400) determines a count of data elements in the sub-trie depending from the selected node. (*Id.* at ll. 63-65.) Additionally, as part of step 412, the method (400) updates the count stored in the node or an associated data structure. (Col. 7, ll. 1-2.) In particular, Gupta discloses that the method (400) compares the count with a threshold. (*Id.* at l. 5.)

Spinney

6. Spinney generally relates to address translation used in packet data communications and, in particular, to performing source and destination address lookups in a system utilizing a combination of hashing, binary search, and CAM lookup. (Col. 1, ll. 34-38.) In particular, Spinney discloses processing a 48-bit destination address. (Col. 15, ll. 4-10.)

7. Spinney discloses CAM technology, which requires only one read operation to compare all stored addresses with an incoming address. (Col. 2, ll. 8-10.)

8. Spinney's figure 1 depicts a packet data communications network that includes a controller (10), which contains a processor or state machine (20) to execute various processes. (Col. 5, ll. 4-7, 45-49.)

IV. ANALYSIS

35 U.S.C. § 112, First Paragraph Rejection

Claims 32 and 34

Dependent claims 32 and 34 recite, respectively, "the tree walk and CAM search are being executed sequentially," and "traverse of the tree structure and CAM read are performed sequentially."

As detailed in the Findings of Fact section above, Appellants' Specification discloses that although tree walking and CAM searching/reading are started simultaneously, both processes may finish in any sequential order. (FF 1.) An ordinarily skilled artisan would immediately discern from the cited portions of the original disclosure that although tree walking and CAM searching/reading start simultaneously, one process finishes performing or executing before the other. Put another way,

an ordinarily skilled artisan would have recognized that tree walking and CAM searching/reading are executed or performed sequentially. Thus, we find that an ordinarily skilled artisan would be able to discern from the original disclosure that Appellants had possession of the inventive concept of executing or performing tree walking and CAM searching/reading sequentially. It follows that Appellants have shown that the Examiner erred in finding that dependent claims 32 and 34 do not comply with the written description requirement under 35 U.S.C. § 112, first paragraph.

35 U.S.C. § 103(a) Rejection

Claim 1

Independent claim 1 recites, in relevant parts:

> 1) setting a threshold based upon a fixed number of nodes to be traversed in the tree structure; 2) using select bits from the packet to traverse said tree structure until the threshold is met; and 3) storing in a Contents Address Memory (CAM) at least one entry based upon a predetermined characteristic of the packet and a second predetermined characteristic of said tree structure.

As detailed in the Findings of Fact section above, Gupta discloses searching for data in compact data structures in a large database. (FF 2.) In particular, Gupta discloses a hybrid trie data structure, which include search nodes. (FF 3.) Gupta discloses utilizing a search node to traverse the hybrid trie and matching a search key against a set of predetermined values. (*Id.*) Further, Gupta discloses a data lookup operation that exhausts a search key until there are no further nodes to review. (FF 4.) We find that Gupta's disclosure of exhausting a search key amounts to searching all the nodes in a tree structure until there are no further nodes to review.

Next, Gupta discloses selecting a node within a hybrid trie to be updated. (FF 5.) Gupta discloses that the update process begins by determining a count of data elements in a sub-trie depending from the selected node. (*Id.*) Thereafter, Gupta discloses comparing the count of data elements with a threshold. (*Id.*) We find that Gupta's disclosure teaches determining the number of nodes in a sub-tree structure and, subsequently, comparing the respective number against a threshold. In summary, we find that an ordinarily skilled artisan would understand that Gupta's disclosure of searching all the nodes in a tree structure until there are no further nodes to review, in conjunction with determining the number of nodes in a sub-tree structure and comparing the respective number against a threshold, teaches or suggests establishing a threshold based on a fixed number of nodes to review in a tree structure. Consequently, we find that Gupta teaches "setting a threshold based upon a fixed number of nodes to be traversed in the tree structure," as recited in independent claim 1

Next, Spinney discloses searching a system for a destination address, such as 48-bit destination address, utilizing a combination of hashing, binary search, and CAM lookup. (FF 6.) We find that Spinney teaches a system that receives an address (e.g., 48-bit destination address), correlates the address with a database, and searches the database utilizing a binary search and CAM lookup combination. In summary, we find that an ordinarily skilled artisan would have readily appreciated utilizing bits from Spinney's 48-bit destination address to search Gupta's tree structure until the established threshold has been met. Thus, we find that the proffered combination teaches "using select bits from the packet to traverse said tree structure until the threshold is met," as recited in independent claim 1.

Additionally, Spinney discloses a CAM that stores all data packet addresses. (FF 7.) In particular, we find that an ordinarily skilled artisan would have understood that storing *all* data packet addresses includes storing characteristics pertaining to both a data packet address and the location of the address in a corresponding tree structure. Thus, we find that Spinney teaches or suggests "storing in a Contents Address Memory (CAM) at least one entry based upon a predetermined characteristic of the packet and a second predetermined characteristic of said tree structure," as recited in independent claim 1.

Finally, we are not persuaded by Appellants' argument that modifying Gupta to teach setting a threshold based on fixed number of nodes and traversing the tree until the threshold is met would effectively change Gupta's principle of operation. (Br. 9.) We note that Appellants have not identified any particular principle that would be changed, nor have Appellants' identified how the Examiner's proffered combination would change that principle. Further, we are not persuaded by Appellants argument that Gupta's disclosure of traversing all nodes in a branch teaches away from the traversing a fixed number of nodes, as claimed. (*Id.* at 10.) As set forth above, Gupta's disclosure teaches or suggests establishing a threshold based on a fixed number of nodes to review in a tree structure. Additionally, no portion of Gupta acts to "criticize, discredit, or otherwise discourage" traversing a fixed number of nodes. *See In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004). It follows that Appellants have not shown that the Examiner erred in concluding that independent claim 1 is unpatentable over the combination of Gupta and Spinney.

Claim 2 through 4, 6 through 8, 10 and 31

Appellants does not set forth any substantive arguments, but rather makes general allegations that the cited text does not teach the language of independent claim 8, and dependent claims 2 through 4, 6, 7, 10, and 31. (Br. 11-13 & 17-20.) Appellants are reminded that a statement that merely points out what the claim recites will not be considered as an argument for separate patentability of a claim. *See* 37 C.F.R. § 41.37(c)(1)(vii). Therefore, Appellants' arguments are unpersuasive. It follows that Appellants have not shown that the Examiner erred in concluding that dependent claim 2 through 4, 6, and 7 are unpatentable over the combination of Gupta, Spinney, and Weaver, and independent claim 8, and dependent claims 10 and 31, are unpatentable over the combination Gupta and Spinney.

Claims 9, 11, 21 through 23, 28 through 31, and 33

Appellants do not provide separate arguments for patentability with respect to independent claims 21 and 28, and dependent claims 9, 11, 22, 23, 29 through 31, and 33. Therefore, we select independent claim 1 as representative of the cited claims. Consequently, Appellants have not shown error in the Examiner's rejection of independent claims 21 and 28, and dependent claims 9, 11, 22, 23, 29 through 31, and 33, for the reasons set forth in our discussion of independent claim 1. *See* 37 C.F.R. § 41.37(c)(1)(vii).

Claim 12

As detailed in the Findings of Fact section above, Spinney discloses a controller that contains a processor or state machine to execute various processes. (FF 8.) We find that Spinney teaches a controller that includes a single processor which executes various processes. However, we agree with

Appellants that Spinney falls short of teaching or suggesting "an embedded processor complex including a plurality of protocol processors," as recited in independent claim 12. (Br. 13-14.) Therefore, the Examiner has improperly relied upon Spinney's disclosure to teach the disputed limitation. Further, we find that Gupta does not cure the noted deficiencies of Spinney.

Since Appellants have shown at least one error in the Examiner's rejection of independent claim 12, we need not reach the merits of Appellants' other arguments. It follows that Appellants have shown that the Examiner erred in concluding that independent claim 12 is unpatentable over the combination of Gupta and Spinney.

Claims 13 through 20, 26, and 27

Because dependent claims 13 through 20, 26, and 27 also recite the limitation discussed above, we find that Appellants have also shown error in the Examiner's rejection of these claims for the reasons set forth in our discussion of independent claim 12.

VI. CONCLUSIONS OF LAW

1. Appellants have shown that the Examiner erred in rejecting claims 32 and 34 as failing to comply with the written description requirement under 35 U.S.C. § 112, first paragraph.

2. Appellants have not shown that the Examiner erred in rejecting claims 1, 2 through 4, 6 through 11, 21 through 23, 28 through 31, and 33 as being unpatentable under 35 U.S.C. § 103(a).

3. Appellants have shown that the Examiner erred in rejecting claims 12 through 20, 26, and 27 as being unpatentable under 35 U.S.C. § 103(a).

VII. DECISION

1. We reverse the Examiner's decision to reject claims 32 and 34 as failing to comply with the written description requirement under 35 U.S.C. § 112, first paragraph.

2. We affirm the Examiner's decision to reject claims 1, 2 through 4, 6 through 11, 21 through 23, 28 through 31, and 33 as being unpatentable under 35 U.S.C. § 103(a).

3. We reverse the Examiner's decision to reject claims 12 through 20, 26, and 27 as being unpatentable under 35 U.S.C. § 103(a).

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED-IN-PART

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